DETAILED ACTION

Response to Arguments

1.   Applicant's arguments with respect to claims 1-25 have been considered but are

moot in view of the new ground(s) of rejection.

Specification

2.   The disclosure is objected to because of the following informalities. Appropriate

correction is required.

Regarding **equation 2**, it is suggested that variables g and b switch places such

that variable g has coefficient +1 and variable b has coefficient -2 such that equation 2

is consistent with equation 1.

Claim Objections

3.   **Claim 2** objected to because of the following informalities. Appropriate

correction is required.

Regarding **claim 2**, the following amendment is suggested "is a second

~~weigh~~weight given to the green color value".

Claim Rejections - 35 USC § 101

4.   35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of
> matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the
> conditions and requirements of this title.

5.   **Claims 22,25** rejected under 35 U.S.C. 101 because the claimed invention is

directed to non-statutory subject matter.

Regarding **claims 22,25**, a method executed by a computer or firmware

implemented in software that is not stored on a computer or firmware readable medium

is non-statutory subject matter. It is suggested to limit the software to be stored on a

computer or firmware readable medium

Claim Rejections - 35 USC § 103

6.   The text of those sections of Title 35, U.S. Code not included in this action can

be found in a prior Office action.

7.   **Claims 1-2,22** rejected under 35 U.S.C. 103(a) as being unpatentable over

     i.   Luo (2005/0047656 A1) in view of

     ii.   Ioffe (US 7,343,028 B2).

Regarding **claim 1**, Luo discloses a method for removing a red eye from an

image, comprising: calculating a weighted red value for each pixel in the image based

on (1) red, green, and blue color values (pg. 3 [0061-0064] – equation 1 teaches a

weighted red value from red, green, and blue, normalized by a total pixel energy);

selecting a plurality of pixels in the image having weighted red values greater than a

threshold as red eye pixels 88 (fig. 9, pg. 4 [0065-0072]); and correcting the red eye

pixels to remove the red eye from the image (pg. 1 [0009], pg. 10 [0128-0129]).

Luo does not expressly disclose based on (2) a luminance of each pixel in the

image.

Ioffe discloses a red eye detection method comprising a step to enhance red eye

detection by normalizing each pixel by dividing by the average luminance (col. 4 lines

25, 30-31 – average luminance being based on luminance of each pixel). At the time of

the invention it would have been obvious to one of ordinary skill in the art to modify the

equation to obtain a weighted red value by normalizing by pixel energy as taught by Luo

to rather try normalizing by luminance as taught by Ioffe because it would have

constituted a substitution of old elements, the combination yielding no more than one

would expect from such an arrangement.

Regarding **claim 2**, Luo as viewed discloses the method of claim 1, wherein said

calculating comprises: $14 f_1 = c_1(1) r + c_2(1) g + c_3(1) b Y$,wherein f.sub.1 is

the weighted red value, r is the red color value, g is the green color value, b is the blue

color value, c.sub.1.sup.(1) is a first weight given to the red color value, c.sub.2.sup.(1)

is a second weigh given to the green color value, c.sub.3.sup.(1) is a third weight given

to the blue color value, and Y is the luminance (Luo pg. 3 [0061-0062]).

Regarding **claim 22**, Luo as viewed discloses the method of claim 1, wherein the

method is implemented in software executed by a computer or firmware embedded into

digital cameras, printers, scanners, or mobile phones (Luo fig. 2, pg. 1 [0006], pg. 2

[0051-0052], Hardeburg col. 3 lines 45-58).

8.   **Claim 4** rejected under 35 U.S.C. 103(a) as being unpatentable over

       i.   Luo (2005/0047656 A1) in view of

      ii.   Ioffe (US 7,343,028 B2)

      as applied to claim 2, and further in view of

      iii.   Jarman (US 2004/0240747 A1).

Regarding claim 4, Luo as viewed does not expressly disclose claim 4.

Jarman discloses a red eye detection and correction method comprising the method of claim 2, prior to said correcting, further comprising: calculating another weighted red value for each pixel in the image from the red, the green, the blue color values, and the luminance of each pixel in the image, comprising: 15 f 2 = c 1 (2) r + c 2 (2) g + c 3 (2) b Y ,wherein f.sub.2 is said another weighted red value, c.sub.1.sup.(2) is another first weight given to the red color value, c.sub.2.sup.(2) is another second weigh given to the green color value, and c.sub.3.sup.(2) is another third weight given to the blue color value; and selecting another plurality of pixels in the image having another weighted red values greater than another threshold as additional red eye pixels (figs. 2-9, pg. 4 [0086-0091] – red, green and blue values are used to compute HSL values; In Pass 1, three types of red eye are detected with associated saturation and lightness levels including variations of the color red such as pink). At the time of the invention it would have been obvious to one of ordinary skill in the art to modify the previous red eye detecting algorithm to check for more then one type of red eye using red weighted values specific to each type as taught above by Jarman in order to more fully detect red eye (pg. 1 [0007]).

9.   **Claims 6,9-10,13,18** rejected under 35 U.S.C. 103(a) as being unpatentable over

      i.   Luo (2005/0047656 A1) in view of

      ii.   Ioffe (US 7,343,028 B2)

      as applied to claim 1, and further in view of

      iii.   DeLuca (US 7,042,505 B1).

Regarding **claim 6**, Luo as viewed does not expressly disclose claim 6.

DeLuca discloses a red eye detection and correction method comprising the method of claim 1, prior to said correcting, further comprising: grouping a plurality of red eye pixels that are contiguous into a red eye region (col. 3 line 67); determining if the red eye region comprises a substantially round pupil (fig. 3, col. 3 lines 19-23); and rejecting the plurality of red eye pixels when the red eye region does not comprise a substantially round pupil (col. 4 lines 4-5, 11-13). At the time of the invention it would have been obvious to one of ordinary skill in the art to modify the previous red eye verification to also verify if the current red eye region round as taught above by DeLuca in order to aid in "eliminating red-eye phenomenon" (col. 6 line 29).

Regarding **claim 9**, DeLuca discloses the method of claim 6, further comprising: determining if the red eye region is too close to another red eye region formed by grouping another plurality of red eye pixels that are contiguous 410; and rejecting the plurality of red eye pixels when the red eye region is too close to said another red eye region 415 (fig. 10, col. 4 lines 14-27).

Regarding **claim 10**, DeLuca discloses the method of claim 9, wherein said

determining if the red eye region is too close to another red eye region comprises:

determining if a geometric center of the red eye region is within a range of distances of

another geometric center of said another red eye region, wherein the range of distances

is proportional to a pupil radius of the red eye region (fig. 10, col. 4 lines 14-27 – the

radius of the grouping involves determining a geometric center, proportional by 2 to 5

times).

Regarding **claim 13**, DeLuca discloses the method of claim 9, further comprising:

determining if the red eye region is proximate to a facial region; and rejecting the

plurality of red eye pixels when the red eye region is not proximate to a facial region

(col. 4 lines 21, 29, 33, 46, 14-46).

Regarding **claim 18**, DeLuca discloses the method of claim 13, further

comprising: determining if the red eye region is proximate to a sclera; and rejecting the

plurality of red eye pixels when the red eye region is not proximate to a sclera (fig. 6,

col. 4 lines 21-44).

10.   **Claim 7** rejected under 35 U.S.C. 103(a) as being unpatentable over

        i.   Luo (2005/0047656 A1) in view of

       ii.   Ioffe (US 7,343,028 B2)

iii.   DeLuca (US 7,042,505 B1)

as applied to claim 6, and further in view of

iv.   Hanna (US 6,714,665 B1).

Regarding **claim 7**, Luo as viewed does not expressly disclose claim 7.

Hanna discloses a pupil detection method comprising the method of claim 6, wherein said determining if the red eye region comprises a substantially round pupil comprises: determining a geometric center of the red eye region; for each radius in a range of radii, determining a difference between (1) weighted red values of red eye pixels located at a radius and at a range of angles about the geometric center and (2) weighted red values of red eye pixels located at a next radius in the range of radii and at the range of angles; selecting one radius in the range of radii that provides a largest difference as a pupil radius for the red eye region; determining a first ratio of (1) a first number of red eye pixels located in a circle having the pupil radius to (2) an area of the circle; determining a second ratio of (1) a second number of red eye pixels in a ring having an inner radius of the pupil radius and an outer radius of a maximum radius in the range of radii to (2) an area of the ring; and determining a difference between the first ratio and the second ratio, wherein the red eye region does not comprise a substantially round pupil when the difference is less than a threshold (fig. 22b, col. 48 lines 30- 63). At the time of the invention it would have been obvious to one of ordinary skill in the art to modify the previous red eye region validation to further verify region roundness as taught above by Hanna in order to require no involvement by object in the image (col. 1 lines 67).

11.   **Claim 8** rejected under 35 U.S.C. 103(a) as being unpatentable over

  i.   Luo (2005/0047656 A1) in view of

  ii.   Ioffe (US 7,343,028 B2)

  iii.   DeLuca (US 7,042,505 B1)

  iv.   Hanna (US 6,714,665 B1)

  as applied to claim 7, and further in view of

  v.   Gaubatz (US 7,155,058 B2).

Regarding **claim 8**, Gaubatz as further viewed (refer to the rejection of claim 11) discloses the method of claim 7, wherein the range of radii ranges from 0.5 to 1.5 times a distance from the geometric center to a farthest red eye pixel in the red eye region (fig. 8, 9 – on graph pixel 4 being the farthest red eye pixel the radi considered range from 2-6, .5 to 1.5 times 4).

12.   **Claim 11** rejected under 35 U.S.C. 103(a) as being unpatentable over

  i.   Luo (2005/0047656 A1) in view of

  ii.   Ioffe (US 7,343,028 B2)

  iii.   DeLuca (US 7,042,505 B1)

  as applied to claim 10, and further in view of

  iv.   Gaubatz (US 7,155,058 B2).

Regarding **claim 11**, Luo as viewed does not expressly disclose claim 11.

Gaubatz discloses a red eye detection and correction method comprising the method of claim 10, further comprising determining the pupil radius as follows: determining the geometric center of the red eye region (fig. 8 – point 0); for each radius in a range of radii, determining a difference between (1) weighted red values of red eye pixels located at a radius and at a range of angles about the geometric center and (2) weighted red values of red eye pixels located at a next radius in the range of radii and at the range of angles; and selecting one radius in the range of radii that provides a largest difference as a pupil radius for the red eye region (fig. 8, 9, col. 15 lines 18-57 – difference is found when computing min and greater than). At the time of the invention it would have been obvious to one of ordinary skill in the art to modify the previous red eye region validation to proper discard pixels outside of an appropriate pixel radius as taught above by Gaubetz in order to do red eye correction efficiently (Gaubetz col. 2 lines 40-43).

13. **Claim 12** rejected under 35 U.S.C. 103(a) as being unpatentable over

      i.   Luo (2005/0047656 A1) in view of

      ii.   Ioffe (US 7,343,028 B2)

      iii.   DeLuca (US 7,042,505 B1)

      iv.   Gaubatz (US 7,155,058 B2)

      as applied to claim 11, and further in view of

      v.   Gallagher (US 2005/0196067 A1).

Regarding **claim 12**, Luo as viewed does not expressly disclose claim 12.

Gallagher discloses a red eye detection and correction method comprising the

method of claim 11, wherein the range of distances comprises 10 to 14 times the pupil

radius (pg. 6 [0083-0094] — Rd*T3 is equivalent to multiples of the pupil radius). At the

time of the invention it would have been obvious to one of ordinary skill in the art to

modify the previous pupil radius selection to consider ranges as taught above by

Gallagher in order to be more responsive to red region grouping situations (Gallagher

pg. 1[0010]).

14.   **Claim 14** rejected under 35 U.S.C. 103(a) as being unpatentable over

      i.   Luo (2005/0047656 A1) in view of

      ii.   Ioffe (US 7,343,028 B2)

      iii.   DeLuca (US 7,042,505 B1)

      as applied to claim 13, and further in view of

      iv.   Luo1 (US 7,035,461 B2).

Regarding claim 14, Deluca further discloses the method of claim 13, wherein

said determining if the red eye region is proximate to a facial region comprising: in a ring

having an inner and outer radii proportional to a pupil radius of the red eye region (col. 4

lines 12-16); rejecting the plurality of red eye pixels if the most common color in the red

eye region is not within the range of the threshold skin colors.

Luo as viewed does not expressly disclose generating a histogram for pixels

S4a-d (fig. 3); selecting a most common color value in the histogram S4e; comparing

the most common color to a range of threshold skin colors S4i-j.

Luo1 discloses a red eye detection and correction method comprising generating

a histogram for pixels S4a-d (fig. 3); selecting a most common color value in the

histogram S4e; comparing the most common color to a range of threshold skin colors

S4i-j. At the time of the invention it would have been obvious to one of ordinary skill in

the art to modify the previous red eye region verification process to further detect facial

regions by the histogram method taught above by Luo1 in order to improve face region

detection (Luo1 col. 2 lines 5-6).

15.   **Claim 15** rejected under 35 U.S.C. 103(a) as being unpatentable over

       i.   Luo (2005/0047656 A1) in view of

      ii.   Ioffe (US 7,343,028 B2)

     iii.   DeLuca (US 7,042,505 B1)

     iv.   Luo1 (US 7,035,461 B2)

      as applied to claim 14, and further in view of

      v.   Chen (US 6,895,112 B2).

Regarding **claim 15**, Luo as viewed does not expressly disclose claim 15.

Chen discloses a red eye detection method comprising the method of claim 14,

wherein said comparing comprises comparing the most common color value in HSV

color space to the range of threshold skin colors in HSV color space (col. 3 lines 34-51).

At the time of the invention it would have been obvious to one of ordinary skill in the art

to modify the previous red eye region detection method to further carry out skin tone

comparison in the HSV color space in order to ensure accuracy when identifying pixels

that are of skin color (Chen col. 3 lines 36-38).

16.   **Claim 16** rejected under 35 U.S.C. 103(a) as being unpatentable over

       i.   Luo (2005/0047656 A1) in view of

      ii.   Ioffe (US 7,343,028 B2)

     iii.   DeLuca (US 7,042,505 B1)

     iv.   Luo1 (US 7,035,461 B2)

     as applied to claim 14, and further in view of

      v.   Gaubatz (US 7,155,058 B2).

Regarding **claim 16**, Luo as further viewed (refer to the rejection of claim 11)

discloses the method of claim 14, further comprising determining the pupil radius as

follows: determining a geometric center of the red eye region (fig. 8 point 0); for each

radius in a range of radii, determining a difference between (1) weighted red values of

red eye pixels located at a radius and at a range of angles about the geometric center

and (2) weighted red values of red eye pixels located at a next radius in the range of

radii and at the range of angles; and selecting one radius in the range of radii that

provides a largest difference as a pupil radius for the red eye region (Gaubatz fig. 22b,

col. 48 lines 30- 63).

17.   **Claim 17** rejected under 35 U.S.C. 103(a) as being unpatentable over

       i.   Luo (2005/0047656 A1) in view of

      ii.   Ioffe (US 7,343,028 B2)

      iii.   DeLuca (US 7,042,505 B1)

      iv.   Luo1 (US 7,035,461 B2)

      v.   Gaubatz (US 7,155,058 B2)

      as applied to claim 16, and further in view of

      vi.   Gallagher (US 2005/0196067 A1).

Regarding claim 17, Luo as further viewed (refer to the rejection of claim 12)

discloses the method of claim 16, wherein the inner and outer radii comprises of 4 to 9

times the pupil radius (Gallagher pg. 5 [0073-0081] – Rd*T3 is equivalent to multiples of

the pupil radius).

18.   **Claim 19** rejected under 35 U.S.C. 103(a) as being unpatentable over

      i.   Luo (2005/0047656 A1) in view of

      ii.   Ioffe (US 7,343,028 B2)

      iii.   DeLuca (US 7,042,505 B1)

      as applied to claim 18, and further in view of

      iv.   Gupta (US 6,204,858 B1).

Regarding **claim 19**, Luo as viewed does not expressly disclose claim 19.

Gupta discloses a red eye detection and correction method comprising the

method of claim 18, wherein said determining if the red eye region is proximate to a

sclera comprises: generating a luminance histogram for pixels in a ring having an inner

and outer radii proportional to a pupil radius of the red eye region; selecting a brightest

color in the luminance histogram; determine a ratio between a number of pixels in the

ring having the brightest color to a number of red eye pixels within a circle having the

pupil radius; and rejecting the plurality of red eye pixels when the ratio is less than a

threshold (fig. 2, 8, col. 2 line 62, col. 4 lines 42-59). At the time of the invention it would

have been obvious to one of ordinary skill in the art to modify the previous as taught

above by Gupta in order to aide in the automation of red eye detection (Gupta col. 2

lines 19-21).

19.   **Claims 20-21** rejected under 35 U.S.C. 103(a) as being unpatentable over

        i.   Luo (2005/0047656 A1) in view of

        ii.   Ioffe (US 7,343,028 B2)

        iii.   DeLuca (US 7,042,505 B1)

        iv.   Gupta (US 6,204,858 B1)

        as applied to claim 19, and further in view of

        v.   Gaubatz (US 7,155,058 B2).

Regarding **claim 20**, Luo as further viewed (refer to the rejection of claim 11)

discloses the method of claim 19, further comprising determining the pupil radius as

follows: determining a geometric center of the red eye region (fig. 8 point 0); for each

radius in a range of radii, determining a difference between (1) weighted red values of

red eye pixels located at a radius and at a range of angles about the geometric center

and (2) weighted red values of red eye pixels located at a next radius in the range of

radii and at the range of angles; and selecting one radius in the range of radii that

provides a largest difference as a pupil radius for the red eye region (Gaubatz fig. 22b,

col. 48 lines 30- 63).

Regarding **claim 21**, Gaubatz discloses the method of claim 20, wherein the

inner and the outer radii comprises 2 to 5 times the pupil radius (fig. 8, 9 – considering a

default pupil radius of 1).

Allowable Subject Matter

20.   **Claims 3,5** objected to as being dependent upon a rejected base claim, but

would be allowable if rewritten in independent form including all of the limitations of the

base claim and any intervening claims.

21.   **Claim 23-24** allowed.

22.   **Claim 25** would be allowable if rewritten or amended to overcome the

rejection(s) under 35 U.S.C. 101, set forth in this Office action.

Conclusion

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to PAUL SAUNDERS whose telephone number is

(571)270-3319. The examiner can normally be reached on Mon-Thur 9am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, NgocYen Vu can be reached on 571.272.7320. The fax phone number for

the organization where this application or proceeding is assigned is 571-273-8300.

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/PS/
8/2/2008

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